



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/536,779	12/01/2005	Nigel Paul Schofield	MO2B161	2871
20411 7590 07/21/2008 The BOC Group, Inc. 575 MOUNTAIN AVENUE MURRAY HILL, NJ 07974-2082				
EXAMINER MYERS, JESSICA L				
ART UNIT 3746		PAPER NUMBER		
MAIL DATE 07/21/2008		DELIVERY MODE PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/536,779

Applicant(s)

SCHOFIELD, NIGEL PAUL

Examiner

JESSICA L. MYERS

Art Unit

3746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 6/12/08.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 5/26/2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/CDC)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date 5/26/05, 6/12/08

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 3, 4, and 6-14 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent 6,863,493 to Stones et al. (Stones et al.).

In Reference to Claim 1

Stones et al. teach a vacuum pumping arrangement (see figure 1) comprising a drive shaft, a motor for driving the drive shaft (vertical shaft (6)), a molecular pumping mechanism (molecular drag section (2)) and a regenerative pumping mechanism (regenerative section (1)), wherein said drive shaft is arranged for simultaneously driving said molecular pumping mechanism and said regenerative pumping mechanism (see figure 1, where both the molecular drag section and the regenerative section are driven by the shaft (6)) and said drive shaft is supported by a lubricant free bearing (lower bearing (26) shown in figure 2, see also column 2 lines 41-48) associated with said molecular pumping mechanism (the lower bearing is associated with the molecular

Art Unit: 3746

pumping mechanism in the sense that it supports the shaft which drives the molecular pumping mechanism).

In Reference to Claim 3

Stones et al. teach the arrangement as claimed in claim 1 (see the rejection of claim 1 above), wherein the lubricant free bearing and the molecular pumping mechanism are substantially axially aligned (both the lower bearing (26) and the molecular drag section (2) are aligned on the central rotational axis of the shaft (6)).

In Reference to Claim 4

Stones et al. the arrangement as claimed in claim 1 (see the rejection of claim 1 above), wherein the drive shaft is additionally supported by a lubricated bearing (upper bearing (24), see figure 2, see also column 2 lines 41-48) associated with the regenerative pumping mechanism (the upper bearing is associated with the regenerative pumping mechanism in the sense that it supports the shaft which drives the regenerative pumping mechanism).

In Reference to Claim 6

Stones et al. teach the arrangement as claimed in claim 4 (see the rejection of claim 4 above), wherein the lubricated bearing and the regenerative pumping mechanism are substantially axially aligned (both the upper bearing (24) and the regenerative pumping section (1) are aligned on the central rotational axis of the shaft (6)).

In Reference to Claim 7

Stones et al. teach the arrangement as claimed in claims 4 (see the rejection of claim 4 above), wherein the regenerative pumping mechanism comprises a stator (casing (3) acts as a stator, see figure 1 and column 1 lines 14-17) comprising a plurality of circumferential pumping channels (the channels in the middle portion of casing (3), see figure 1, that surround the vertical blades of rotor (9)) disposed about a longitudinal axis of the drive shaft (the vertical axis of shaft (6)) and a rotor comprising a plurality of arrays of rotor blades (rotor (9) with unnumbered vertical blades) extending axially into the respective said circumferential pumping channels (see figure 1).

In Reference to Claim 8

Stones et al. teach the arrangement as claimed in claim 7 (see the rejection of claim (7) above), wherein the rotor of the regenerative pumping mechanism is connected to the drive shaft so as to be sufficiently close to the lubricated bearing (The rotor (9) of the regenerative pump (1) is vertically adjacent to the lubricated bearing (4), see figure 1) so that radial movement of the drive shaft at the lubricant free bearing translates substantially to axial movement of the rotor blades relative to the respective circumferential pumping channels (because the rotor (9) and the lubricated bearing (4) are vertically adjacent, any movement of the opposite end of the shaft, the end nearest to the non-lubricated bearing, would result in axial movement of the rotor blades with respect to the pumping channels, since the rotor would pivot about the upper bearing).

In Reference to Claim 9

Stones et al. teach the arrangement as claimed in claim 7 (see the rejection of claim 7 above), wherein the lubricated bearing and the circumferential pumping

Art Unit: 3746

channels are substantially axially aligned (both the upper bearing (24) and the unnumbered pumping channels are aligned on the central rotational axis of the shaft (6)).

In Reference to Claim 10

Stones et al. teach the arrangement as claimed in claim 7 (see the rejection of claim 7 above), wherein the lubricated bearing is housed in the stator of the regenerative pumping mechanism (see figure 1 where the upper bearing (4) is housed in the casing (3) which acts as a stator).

In Reference to Claim 11

Stones et al. teach the arrangement as claimed in claim 1 (see the rejection of claim 1 above), wherein the molecular pumping mechanism comprises a molecular drag pumping mechanism (The molecular pumping mechanism is a molecular drag or Holweck section. See column 1 lines 60-62.).

In Reference to Claim 12

Stones et al. teach the arrangement as claimed in claim 1 (see the rejection of claim 1 above), wherein the molecular pumping mechanism comprises turbomolecular pumping means (The molecular drag or Holweck section is a turbomolecular pump in the sense that it uses turbine blades to impart momentum to gas molecules).

In Reference to Claim 13

Stones et al. teach the arrangement as claimed in claim 1 (see the rejection of claim 1 above), comprising a housing (casing (3)) which houses the molecular pumping

Art Unit: 3746

mechanism, the regenerative pumping mechanism, the drive shaft and the motor (see figure 1).

In Reference to Claim 14

Stones et al. teach a vacuum pumping arrangement comprising (see figures 1 and 2) a drive shaft (vertical shaft (6)), a motor (electric motor (7)) for driving the drive shaft, and a regenerative pumping mechanism (regenerative section (1)), the drive shaft being supported towards one end thereof by a lubricant free bearing (lower bearing (26)) and towards the other end thereof by a lubricated bearing (upper bearing (24), see column 2 lines 41-48), the regenerative pumping mechanism comprising a stator (casing (3) acts as a stator, see figure 1 and column 1 lines 14-17) comprising a plurality of circumferential pumping channels disposed about a longitudinal axis of the drive shaft (the channels in the middle portion of casing (3), see figure 1, that surround the vertical blades of rotor (9)) and a rotor comprising a plurality of arrays of rotor blades (rotor (9) with unnumbered vertical blades) extending axially into the respective said circumferential pumping channels (see figure 1), the rotor being connected to the drive shaft so as to be sufficiently close to the lubricated bearing (The rotor (9) of the regenerative pump (1) is vertically adjacent to the lubricated bearing (4), see figure 1) so that radial movement of the drive shaft at the lubricant free bearing translates substantially to axial movement of the rotor blades relative to the respective said circumferential pumping channels (because the rotor (9) and the lubricated bearing (4) are vertically adjacent, any movement of the opposite end of the shaft, the end nearest

Art Unit: 3746

to the non-lubricated bearing, would result in axial movement of the rotor blades with respect to the pumping channels, since the rotor would pivot about the upper bearing).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2, and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stones et al. in view of U.S. Patent 5,667,363 to Bernhardt et al. (Bernhardt et al.).

In Reference to Claim 2

Stones et al. teach the arrangement as claimed in claim 1 (see the rejection of claim 1 above), but do not teach what type of bearing the lubricant free bearing is.

Bernhardt et al. teach a similar turbomolecular pump (1) that is supported by lubricant free actively controlled magnetic bearings (8). It would have been obvious to one of ordinary skill in the art at the time of invention to use an actively controlled magnetic bearing as taught by Bernhardt et al. as the lubricant free bearing of Stones et al. since a magnetic bearing provides contact free support and allows the space between the rotor and stator to be minimized (see columns 1-2, lines 51-15).

In Reference to Claim 15

Stones et al. as modified by Bernhardt et al. teach the arrangement as claimed in claim 2 (see the rejection of claim 2 above), wherein the molecular pumping mechanism

comprises a molecular drag pumping mechanism (The molecular pumping mechanism is a molecular drag or Holweck section. See column 1 lines 60-62 of Stones et al.).

In Reference to Claim 16

Stones et al. as modified by Bernhardt et al. teach the arrangement as claimed in claim 15 (see the rejection of claim 15 above), wherein the molecular pumping mechanism comprises turbomolecular pumping means (The molecular drag or Holweck section of Stones et al. is a turbomolecular pump in the sense that it uses turbine blades to impart momentum to gas molecules).

In Reference to Claim 17

Stones et al. as modified by Bernhardt et al. teach the arrangement as claimed in claim 16 (see the rejection of claim 16 above), comprising a housing (casing (3) of Stones et al.) which houses the molecular pumping mechanism, the regenerative pumping mechanism, the drive shaft and the motor (see figure 1 of Stones et al.).

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stones et al. in view of U.S. Patent 4,767,265 to Osterstom (Osterstom).

Stones et al. teach the arrangement as claimed in claim 4 (see the rejection of claim 4 above), but do not teach what type of bearing the lubricated bearing is.

Osterstom teaches a turbomolecular pump (10) that is supported by lubricated ball bearings (12). It would have been obvious to one of ordinary skill in the art at the time of invention to use ball bearings or roller bearings as taught by Osterstom as the lubricated bearing of Stones et al. since Stones et al. do not specify the type of bearings

Art Unit: 3746

used, and since ball bearings do not develop internal instability and offer excellent strength and rigidity (see columns 1-2, lines 58-8 of Osterstom).

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patents 7,160,081 to Rival and 6,135,709 to Stones both teach additional vacuum pumps with similar structures to applicant's.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JESSICA L. MYERS whose telephone number is (571)270-5059. The examiner can normally be reached on Monday through Friday, 8:30am to 5:30pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Kramer can be reached on 571-272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 3746

8. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Devon C Kramer/
Supervisory Patent Examiner, Art
Unit 3746

/JLM